PA 1185761

# THE UNITED STATES OF AMERICA

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**June 23, 2004**

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**APPLICATION NUMBER:** ***60/478,353***
**FILING DATE:** ***June 16, 2003***

**PRIORITY DOCUMENT**
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60478353.061603

PTO/SB/16 (10-01)
Approved for use through10/31/2002. OMB 0651-0032
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# PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.

| INVENTOR(S) | | |
|---|---|---|
| Given Name (first and middle [if any]) | Family Name or Surname | Residence (City and either State or Foreign Country) |
| Sean | Boyle | Kanata Canada |

☐ Additional Inventors are being named on the _____ seperately numbered sheets attached hereto

**TITLE OF THE INVENTION (500 characters max)**

TIRE UNIQUE IDENTIFIER (TUID)

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**ENCLOSED APPLICATION PARTS** *(check all that apply)*

☒ Specification *Number of Pages* 23
☒ Drawing(s) *Number of Sheets* 6
☐ Application Data Sheet. See 37 CFR 1.76
☐ CD(s), Number
☐ Other (specify)

**METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT**

☐ Applicant claims small entity status. See 37 CFR 1.27.
☐ A check or money order is enclosed to cover the filing fees
☒ The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 16-0600
☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE AMOUNT ($) $80.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.
☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

*Respectfully submitted,*

SIGNATURE _____ Date 13 JUN 2003

TYPED or PRINTED NAME Dennis R. Haszko REGISTRATION NO. *(if appropriate)* 39 575

TELEPHONE 613-232-5300 Docket Number: 1636P01US01

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This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

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06/16/03 16478 U.S. PTO

# FEE TRANSMITTAL for FY 2003

*Effective 01/01/2003. Patent fees are subject to annual revision.*

☒ Applicant claims small entity status. See 37 CFR 1.27

**TOTAL AMOUNT OF PAYMENT** ($) 80.00

| *Complete If Known* | |
|---|---|
| Application Number | |
| Filing Date | |
| First Named Inventor | S. Boyle |
| Examiner Name | |
| Art Unit | |
| Attorney Docket No. | 1636P01US01 |

## METHOD OF PAYMENT *(check all that apply)*

☐ Check ☐ Credit card ☐ Money Order ☐ Other ☐ None

☑ Deposit Account:

Deposit Account Number: 16-0600

Deposit Account Name: SHAPIRO COHEN

The Commissioner is authorized to: *(check all that apply)*

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## FEE CALCULATION

### 1. BASIC FILING FEE

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description | Fee Paid |
|---|---|---|---|---|---|
| 1001 | 750 | 2001 | 375 | Utility filing fee | |
| 1002 | 330 | 2002 | 165 | Design filing fee | |
| 1003 | 520 | 2003 | 260 | Plant filing fee | |
| 1004 | 750 | 2004 | 375 | Reissue filing fee | |
| 1005 | 160 | 2005 | 80 | Provisional filing fee | 80.00 |

SUBTOTAL (1) ($) 80.00

### 2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

| | Extra Claims | | Fee from below | Fee Paid |
|---|---|---|---|---|
| Total Claims | | -20** = | | x = |
| Independent Claims | | -3** = | | x = |
| Multiple Dependent | | | | = |

| Large Entity Fee Code | Large Entity Fee ($) | Small Entity Fee Code | Small Entity Fee ($) | Fee Description |
|---|---|---|---|---|
| 1202 | 18 | 2202 | 9 | Claims in excess of 20 |
| 1201 | 84 | 2201 | 42 | Independent claims in excess of 3 |
| 1203 | 280 | 2203 | 140 | Multiple dependent claim, if not paid |
| 1204 | 84 | 2204 | 42 | ** Reissue independent claims over original patent |
| 1205 | 18 | 2205 | 9 | ** Reissue claims in excess of 20 and over original patent |

SUBTOTAL (2) ($)

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## FEE CALCULATION (continued)

### 3. ADDITIONAL FEES

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|---|---|---|---|---|---|
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet | |
| 1053 | 130 | 1053 | 130 | Non-English specification | |
| 1812 | 2,520 | 1812 | 2,520 | For filing a request for *ex parte* reexamination | |
| 1804 | 920* | 1804 | 920* | Requesting publication of SIR prior to Examiner action | |
| 1805 | 1,840* | 1805 | 1,840* | Requesting publication of SIR after Examiner action | |
| 1251 | 110 | 2251 | 55 | Extension for reply within first month | |
| 1252 | 410 | 2252 | 205 | Extension for reply within second month | |
| 1253 | 930 | 2253 | 465 | Extension for reply within third month | |
| 1254 | 1,450 | 2254 | 725 | Extension for reply within fourth month | |
| 1255 | 1,970 | 2255 | 985 | Extension for reply within fifth month | |
| 1401 | 320 | 2401 | 160 | Notice of Appeal | |
| 1402 | 320 | 2402 | 160 | Filing a brief in support of an appeal | |
| 1403 | 280 | 2403 | 140 | Request for oral hearing | |
| 1451 | 1,510 | 1451 | 1,510 | Petition to institute a public use proceeding | |
| 1452 | 110 | 2452 | 55 | Petition to revive - unavoidable | |
| 1453 | 1,300 | 2453 | 650 | Petition to revive - unintentional | |
| 1501 | 1,300 | 2501 | 650 | Utility issue fee (or reissue) | |
| 1502 | 470 | 2502 | 235 | Design issue fee | |
| 1503 | 630 | 2503 | 315 | Plant issue fee | |
| 1460 | 130 | 1460 | 130 | Petitions to the Commissioner | |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17(q) | |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | |
| 8021 | 40 | 8021 | 40 | Recording each patent assignment per property (times number of properties) | |
| 1809 | 750 | 2809 | 375 | Filing a submission after final rejection (37 CFR 1.129(a)) | |
| 1810 | 750 | 2810 | 375 | For each additional invention to be examined (37 CFR 1.129(b)) | |
| 1801 | 750 | 2801 | 375 | Request for Continued Examination (RCE) | |
| 1802 | 900 | 1802 | 900 | Request for expedited examination of a design application | |

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| SUBMITTED BY | | | | (Complete *if applicable*) | |
|---|---|---|---|---|---|
| *Name (Print/Type)* | Dennis R. Haszko | *Registration No. (Attorney/Agent)* | 39 575 | *Telephone* 613 232 5300 | |
| *Signature* | | | | *Date* | 13 JUN 2003 |

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# Tire Unique Identifier (TUID)

## 1. Summary

With hundreds of millions of tires being produced annually by the tire industry, tracking an individual tire throughout its entire life cycle becomes a challenge. By encoding a 64-bit or larger Radio Frequency Identification (RFID) tag, termed the Tire Unique Identifier (TUID), and using a specific implementation process, each new tire being produced can now be uniquely identified, regardless of make or model, for the duration of its functional life, in addition to its disposal, thereby creating an industry-wide solution that facilitates true tire asset tracking and performance analysis.

The invention will be described for the purposes of illustration only in connection with certain embodiments. However, it is to be understood that other objects and advantages of the present invention will be made apparent by the following description of the drawings according to the present invention. While a preferred embodiment is disclosed, this is not intended to be limiting. Rather, the general principles set forth herein are considered to be merely illustrative of the scope of the present invention and it is to be further understood that numerous changes may be made without straying from the scope of the present invention.

### 1.1 Description of the Figures

**Figure 1** is a flowchart detailing the steps in reading a Vehicle TUID from an RFID tag and parsing the TUID for particular data according to a first embodiment of the present invention.

**Figure 2** is a flowchart detailing the steps in reading a Fleet TUID from an RFID tag and parsing the TUID for particular data according to a second embodiment of the present invention.

**Figure 3** is a flowchart detailing the steps in writing a Vehicle TUID to an RFID tag according to a first embodiment of the present invention.

**Figure 4** is a flowchart detailing the steps in writing a Fleet TUID to an RFID tag according to a second embodiment of the present invention.

**Figure 5** is a flowchart detailing the steps in generating the data contained in the Vehicle TUID according to a first embodiment of the present invention.

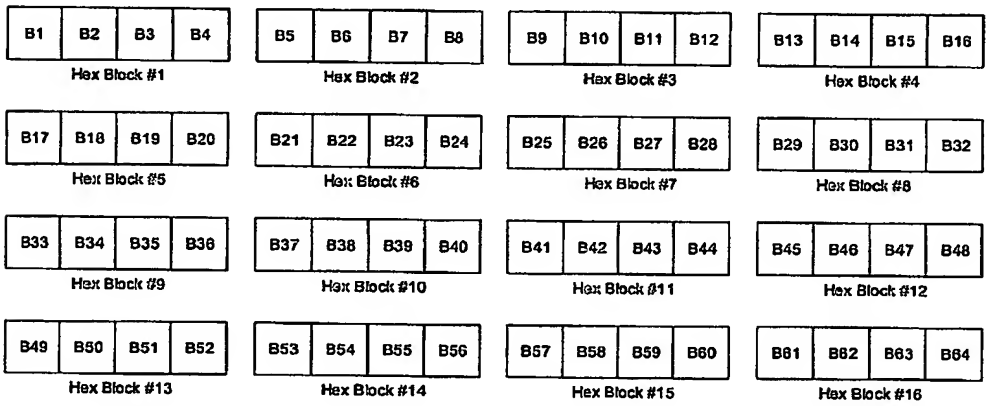
**Figure 6** is a flowchart detailing the steps in generating the data contained in the Fleet TUID according to a second embodiment of the present invention.

## 2. Encoding Scheme

### 2.1 Overview

In order to uniquely identify a tire, an RFID tag encoding scheme generates a unique 64-bit number, referred to as a Tire Unique Identifier (TUID). The TUID's 64 bits consist of 16 groupings of four bits each, as shown in Figure 1. However, the present invention is not limited to the use of hexadecimal numbers, binary or octal numbers, for example, would be suitable.

**Figure 1. TUID: 64 Bits Grouped By 4's Into Hex Blocks**




Each of these four bit groupings represents a hexadecimal number and is referred to as a Hex Block, see Figure 2.

**Figure 2. 64 Bits Represented By 16 Hex Blocks**


Hexadecimal describes a base-16 number system represented by the numbers 0-9 and the letters A-F, as shown in Figure 3.

**Figure 3. Binary to Decimal to Hexadecimal Conversions**

| Binary | Decimal | Hexadecimal |
|---|---|---|
| 0000 | 0 | 0 |
| 0001 | 1 | 1 |
| 0010 | 2 | 2 |
| 0011 | 3 | 3 |
| 0100 | 4 | 4 |
| 0101 | 5 | 5 |
| 0110 | 6 | 6 |
| 0111 | 7 | 7 |
| 1000 | 8 | 8 |
| 1001 | 9 | 9 |
| 1010 | 10 | A |
| 1011 | 11 | B |
| 1100 | 12 | C |
| 1101 | 13 | D |
| 1110 | 14 | E |
| 1111 | 15 | F |

There are two types of TUIDs, one for passenger vehicles and another for commercial fleets. Each type of TUID will be discussed in turn.

### 2.2 Vehicle TUID

A **Vehicle TUID** is designed to provide a unique identifier for each tire on a passenger vehicle or light truck within a continent. A Vehicle TUID is sub-divided into 5 sections:

- Year (YR),
- Tire Manufacturer (TM),
- Tire Description (TD),
- Service Provider (SP), and

- Tire Identifier (TI)

Each section contains one or more hex blocks which are individually located in specific positions in order to add some basic privacy capabilities in addition to preventing fraud and bit manipulation. The sectional and positional formatting of a Vehicle TUID is as depicted in Figure 4, and each section is discussed in turn.

**Figure 4. Vehicle TUID Formatting**

| H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 | H13 | H14 | H15 | H16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TM-1 | SP-1 | TM-2 | SP-2 | YR-1 | SP-3 | YR-2 | SP-4 | TI-1 | SP-5 | TI-2 | SP-6 | TI-3 | TD-1 | TI-4 | TD-2 |

### 2.2.1 Year Section (YR)

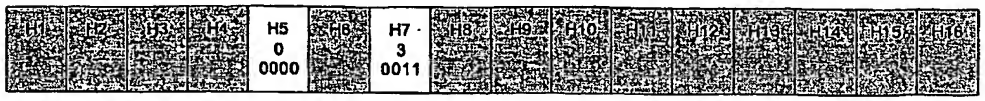
The Year Section consists of two (2) hex blocks long and contains the last two digits of the year the tire was installed. Only numerical hexadecimal values (i.e. the numbers 0 to 9) are valid in either hex block, thereby permitting year values between 00 and 99 inclusively. Hex blocks for the Year Section are found in positions H5 and H7, as shown in Figure 5.

**Figure 5. Vehicle TUID Highlighting The Year Section's Hex Blocks**

| H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 | H13 | H14 | H15 | H16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TM-1 | SP-1 | TM-2 | SP-2 | YR-1 | SP-3 | YR-2 | SP-4 | TI-1 | SP-5 | TI-2 | SP-6 | TI-3 | TD-1 | TI-4 | TD-2 |

If the year of installation was 2003, then the Year Section would be **03** respectively, as shown in Figure 6.

**Figure 6. Year Section Hex Blocks For 2003 Vehicle TUID**




### 2.2.2 Tire Manufacturer Section (TM)

The Tire Manufacturer Section consists of two (2) hex blocks, found in positions H1 and H3 as shown in Figure 7, and is therefore able to uniquely identify up to 225 tire manufacturers per year. Tire manufacturers register their unique Tire Manufacturer ID annually in order to accommodate new manufacturers and discard obsolete ones efficiently.

**Figure 7. Vehicle TUID Highlighting The Tire Manufacturer Section's Hex Blocks**

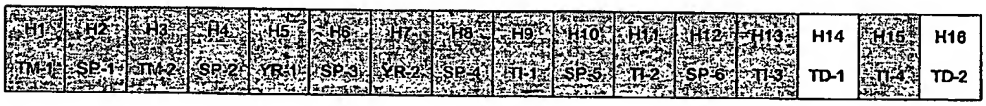

A valid Tire Manufacturer ID is **C3**, as shown in Figure 8.

**Figure 8. Tire Manufacturer Section For Tire Manufacture ID C3**

### 2.2.3 Tire Description Section (TD)

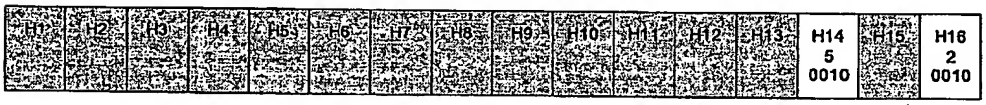
The Tire Description section is two (2) hex blocks long and can be found in positions H14 and H16, as seen in Figure 9. It is able to uniquely identify up to 225 tire models and descriptions per unique tire manufacturer per year and is assigned and managed each year in cooperation with each registered tire manufacturer.

**Figure 9. Vehicle TUID Highlighting The Tire Description Section's Hex Blocks**




A valid Tire Description ID is 52, and is shown in Figure 10.

**Figure 10. Tire Description Section For Tire Description ID 52**

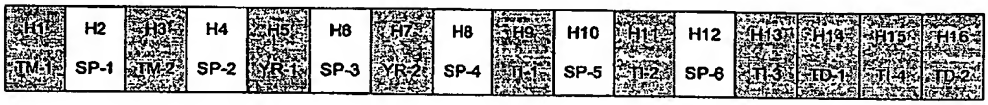



### 2.2.4 Service Provider Section (SP)

The Service Provider section is six (6) hex blocks long and is able to uniquely identify up to 11,390,625 service providers per year. Service Providers are dealerships, garages, tire recyclers or any other entities that service tires in some

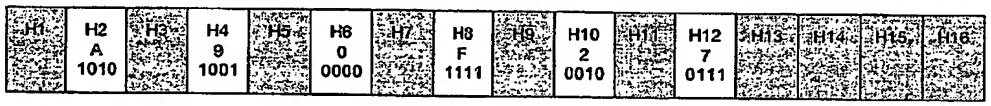
shape or form. Hex blocks for the Service Provider section are found in positions H2, H4, H6, H8, H10 and H12, as shown in Figure 11. Service Providers register their unique Service Provider IDs annually in order to accommodate new entities and discard obsolete ones.

**Figure 11. Vehicle TUID Highlighting The Service Provider Section's Hex Blocks**




An example of a valid Service Provider ID is **A90F27**, as depicted in Figure 12.

**Figure 12. Service Provider Section Showing Service Provider ID A90F27**




### 2.2.5 Tire Identifier Section (TI)

The Tire Identifier section is four (4) hex blocks long and is able to uniquely identify up to 50,625 unique tires from a unique service provider per year. The hex blocks for this section are found in positions H9, H11, H13 and H15, as shown in Figure 14. The Tire Identifier is a random number between 1 to 50,625. This number will be generated by a random number generator seeded using the formula depicted in Figure 13.

**Figure 13. Random Number Generator's Vehicle Seed Formula**

DAY = Day of The Year, acceptable values are between 1 and 366
SPI = Service Provider ID, acceptable values are between 1 and 11,390,625

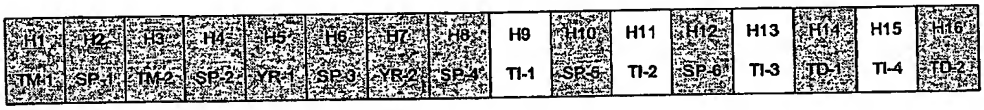
TMI = Tire Manufacturer ID, acceptable values are between 1 and 225

SECOND = Current time's seconds value, acceptable values are between 1 and 59

Random Number Generator's Seed Value = ((DAY x SPI) / TMI) x SECOND

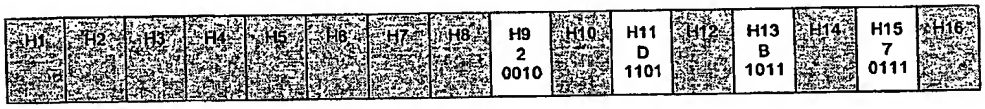
NOTE: The resulting number may need to be truncated depending on the capabilities of the random number generator algorithm implemented.

**Figure 14. Vehicle TUID Highlighting The Tire Identifier Section's Hex Blocks**




A valid Tire Identifier is **2DB7**, as shown in Figure 15.

**Figure 15. Tire Identifier Section Showing Tire Identifier 2DB7**




### 2.2.6 Valid Vehicle TUID

A valid Vehicle TUID, representing TUID **CA39003F22D7B572**, is depicted in Figure 16.

**Figure 16. A Valid TUID, CA39003F22D7B572**

| H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 | H13 | H14 | H15 | H16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C | A | 3 | 9 | 0 | 0 | 3 | F | 2 | 2 | D | 7 | B | 5 | 7 | 2 |
| 1100 | 1010 | 0011 | 1001 | 0000 | 0000 | 0011 | 1111 | 0010 | 0010 | 1101 | 0111 | 1011 | 0101 | 0111 | 0010 |

### 2.3 Fleet TUID

A **Fleet TUID** is designed to provide a unique identifier for each tire on a commercial fleet vehicle within a continent. A Fleet TUID is sub-divided into 5 sections:

- Year (YR),
- Tire Manufacturer (TM),
- Tire Description (TD),
- Service Provider (SP), and
- Tire Identifier (TI)

Each section contains one or more hex blocks which are individually located in specific positions in order to add some basic privacy capabilities in addition to preventing fraud and bit manipulation. The sectional and positional formatting of a Fleet TUID is as depicted in Figure 17, and each section is discussed in turn.

**Figure 17. Fleet TUID Formatting**

| H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 | H13 | H14 | H15 | H16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TM-1 | SP-1 | TM-2 | SP-2 | YR-1 | SP-3 | YR-2 | SP-4 | TI-1 | SP-5 | TI-2 | TI-3 | TI-4 | TD-1 | TI-5 | TD-2 |

#### 2.3.1 Year Section (YR)

The Year Section consists of two (2) hex blocks long and contains the last two digits of the year the tire was installed. Only numerical hexadecimal values (i.e. the numbers 0 to 9) are valid in either hex block, thereby permitting year values between 00 and 99 inclusively. Hex blocks for the Year Section are found in positions H5 and H7, as shown in Figure 18.

**Figure 18. Fleet TUID Highlighting The Year Section's Hex Blocks**


If the year of installation was 2014, then the Year Section would be **14** respectively, as shown in Figure 19.

**Figure 19. Year Section Hex Blocks For 2014 Fleet TUID**

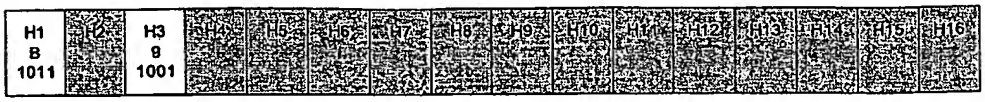

### 2.3.2 Tire Manufacturer Section (TM)

The Tire Manufacturer Section consists of two (2) hex blocks, found in positions H1 and H3 as shown in Figure 20, and is therefore able to uniquely identify up to 225 tire manufacturers per year. Tire manufacturers register their unique Tire Manufacturer ID annually in order to accommodate new manufacturers and discard obsolete ones efficiently.

**Figure 20. Fleet TUID Highlighting The Tire Manufacturer Section's Hex Blocks**


A valid Tire Manufacturer ID is **B9**, as shown in Figure 21.

**Figure 21. Tire Manufacturer Section For Tire Manufacture ID B9**



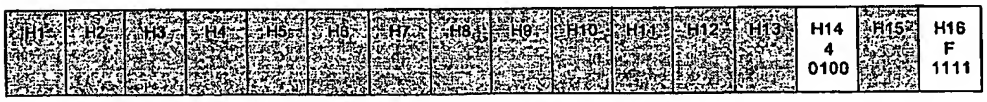

### 2.3.3 Tire Description Section (TD)

The Tire Description section is two (2) hex blocks long and can be found in positions H14 and H16, as seen in Figure 22. It is able to uniquely identify up to 225 tire models and descriptions per unique tire manufacturer per year and is assigned and managed each year in cooperation with each registered tire manufacturer.

**Figure 22. Fleet TUID Highlighting The Tire Description Section's Hex Blocks**


A valid Tire Description ID is **4F**, and is shown in Figure 23.

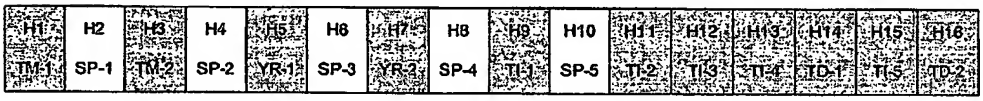
**Figure 23. Tire Description Section For Tire Description ID 4F**



### 2.3.4 Service Provider Section (SP)

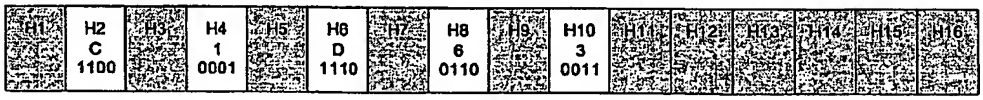
The Service Provider section is five (5) hex blocks long and is able to uniquely identify up to 11,390,625 service providers per year. Service Providers are dealerships, garages, tire recyclers or any other entities that service tires in some shape or form. Hex blocks for the Service Provider section are found in positions H2, H4, H6, H8 and H10, as shown in Figure 24. Service Providers register their unique Service Provider IDs annually in order to accommodate new entities and discard obsolete ones.

**Figure 24. Vehicle TUID Highlighting The Service Provider Section's Hex Blocks**




An example of a valid Service Provider ID is **C1D63**, as depicted in Figure 25.

**Figure 25. Service Provider Section Showing Service Provider ID C1D63**



### 2.3.5 Tire Identifier Section (TI)

The Tire Identifier section is five (5) hex blocks long and is able to uniquely identify up to 50,625 unique tires from a unique service provider per year. The hex blocks for this section are found in positions H9, H11, H12, H13 and H15, as shown in Figure 27. The Tire Identifier is a random number between 1 to 759,375. This number will be generated by a random number generator seeded using the formula depicted in Figure 26.

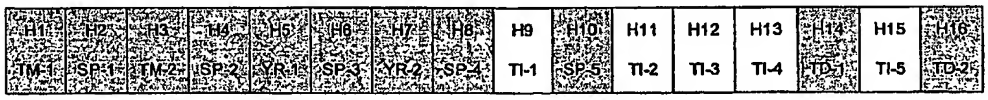
**Figure 26. Random Number Generator's Fleet Seed Formula**

DAY = Day of The Year, acceptable values are between 1 and 366
SPI = Service Provider ID, acceptable values are between 1 and 759,375
TMI = Tire Manufacturer ID, acceptable values are between 1 and 225
SECOND = Current time's seconds value, acceptable values are between 1 and 59

Random Number Generator's Seed Value = ((DAY x SPI) / TMI) x SECOND

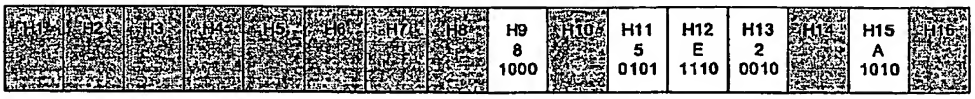
NOTE: The resulting number may need to be truncated depending on the capabilities of the random number generator algorithm implemented.

**Figure 27. Fleet TUID Highlighting The Tire Identifier Section's Hex Blocks**




A valid Tire Identifier is **85E2A**, as shown in Figure 28.

**Figure 28. Tire Identifier Section Showing Tire Identifier 85E2A**




### 2.3.6 Valid Fleet TUID representing TUID BC911D46835E24AF

A valid Fleet TUID, representing TUID **BC911D46835E24AF**, is depicted in Figure 29.

**Figure 29. A Valid TUID, BC911D46835E24AF**

| H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 | H9 | H10 | H11 | H12 | H13 | H14 | H15 | H16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B | C | 9 | 1 | 1 | D | 4 | 6 | 8 | 3 | 5 | E | 2 | 4 | A | F |
| 1011 | 1100 | 1001 | 0001 | 0001 | 1101 | 0100 | 0110 | 1000 | 0011 | 0101 | 1110 | 0010 | 0100 | 1010 | 1111 |

### 3. Implementation

A read/write RFID tag, an RFID Reader Card and a handheld device must be used in order to implement the encoding scheme previously mentioned. Listed below, in section 3.1, is the process for encoding such an RFID tag in order to uniquely identify a tire.

In a hardware implementation, for example, RFID tags and the RFID Reader Card, proprietary of Syscan, may be utilized with to encode TUIDs. The handheld will also connect to a portal through wireless connection.

### 3.1 Initialization

a. The key to TUID is to have the initialization occur at the Service Provider level, this is what gives the TUID the ability to cover all possible tires produced during a given year.

b. A service technician embeds an RFID tag onto the tire such that the tag will remain there for the life of the tire and cannot be tampered or sabotaged.

c. The service technician then puts the tire onto the vehicle, as per any new tire installation.

d. Using an application running on a handheld device with an attached RFID Reader Card, the service technician then generates a TUID as follows:

   i. **Year:** the current year's last two digits are used automatically

ii. **Tire Manufacturer:** the service technician selects from a list of available tire manufacturers, which are tied to their respective Tire Manufacturer IDs

iii. **Tire Description:** the service technician selects from a list of available tire models and descriptions associated with the selected Tire Manufacturer ID

iv. **Service Provider:** is a fixed number that is available after a Service Provider has registered.

v. **Tire Identifier:** a random number is generated based on the formula discussed earlier.

- In the event of a conflict, add the current time's seconds value to the number generated
- If there is still a conflict with the number generated, get the next sequential number available

e. The service technician then brings the handheld device to the spot where the RFID tag has been positioned on the inside of the tire, clicks the handheld application's button to instruct the handheld's RFID Reader Card to write the TUID through the tire's rubber and into the RFID tag itself.

f. This tire's TUID is then registered in a global database for asset tracking, performance analysis and other purposes.

### 3.2 Tire Identification

a. A service technician reads the TUID from a tire's embedded RFID tag by bringing the handheld with the RFID Reader Card next to the spot where the tag has been embedded.

b. The service technician then clicks a button using the handheld's application in order to instruct the RFID Reader Card to read the TUID from the embedded RFID tag.

c. The RFID Reader Card then passes this value to the handheld application which then queries the global database for information relating to that TUID, thereby positively identifying the tire.

d. The handhelds are utilized for reading/writing TUIDs by service technicians at a registered service provider.

**4. Advantages**

a. The key to the TUID is the fact that it is tied to a Service Provider, which facilitates using an RFID tag as an industry-wide solution for uniquely identifying tires, regardless of their brand, make or model.

b. The TUID encoding scheme is the only way that is manufacturer-independent to identify a tire and be able to truly track it through its entire life. The encoding scheme can be used by an service provider, thereby being useful at each point throughout a tire's life cycle.

c. Another benefit results from having a year section as part of the TUID because this provides a built-in optimization and recycling capability for the other sections of the TUID. The current list of say, Service Provider IDs for a given year, only reflects those that have registered, so it could in theory grow or shrink based on the health prospects of Service Providers as a whole. Older methodologies basically tie up a Service Provider for the life of system once it is used, thereby become fat and bloated and inefficient.

d. The sections of a TUID also provide another benefit, improved database performance. This is achieved because most, if not all, of the primary keys required for database transactions can be parsed from the TUID itself, thereby saving time and expensive table joins during a database transaction.

**5. Applications**

The TUID can be designed for the identification of all tires within a continent, and global identification is then achieved continent by continent. The TUID applies to any tire on any vehicle, regardless of the performance characteristics of the tire.

Ultimately, the TUID could become a pervasive tool for tire identification because it does not favour any tire manufacturer or tire technology, and thus is acceptable to all interests attributed to the tire industry.

As such, for any tire that gets assigned a TUID, the tire is then "registered" in database, this is in essence a tire registration site to some degree. The TUID is the link between the hard asset (tire) and the static ownership data which indicates who owns the tire. All of this information is linked to a central database. A specially equipped vehicle will then send tire pressure and temperature data from a Tire Pressure Monitoring System installed on the vehicle back to the central database, where it is linked to the tire by the TUID.

As there are 600 million tires produced annually, a standard sequentially numbered ID tag would require an abundance of bits in order to keep up with these 600 million tires being produced annually. The TUID is novel in that it allows each of these annual 600 million tires to be uniquely identified based on the year. The initialization process of the present invention is advantageous in that it prevents redundancy and overlap in the numbering scheme.

The present invention is not limited to use in the tire industry. Such an encoding scheme may be useful in other fields where products are being tracked by a general database. The encoded RFID and the RFID card reader of the present invention, utilized in a tracking system, is applicable to myriad of fields. In each field, the characteristics such as tire type, would merely be changed to characteristics of the particular object to be encoded in the RFID.

It should be understood that the preferred embodiments mentioned here are merely illustrative of the present invention. Numerous variations in design and use of the present invention may be contemplated in view of the following claims without straying from the intended scope and field of the invention herein disclosed.

What is claimed is:

1. A method of encoding a Radio Frequency Identification (RFID) tag for identifying an object, the method comprising the steps of:

a) at a given service provider, generating a unique object identifier based on at least one characteristic associated with the object;

b) updating a list of object identifiers, stored at a database for the given service provider, to prevent a conflict in the list of object identifiers;

c) writing the unique object identifier to the RFID tag, located on the object; and

d) registering the object in a central database, associated with the service provider, for tracking the object using the unique object identifier.

2. The method as in claim 1, wherein the object is a tire.

3. The method as in claim 1, wherein the at least one characteristic is chosen from the group consisting of: a model of the object, a year of production of the object, a physical characteristic of the object, a service provider for the object, and an object identifier.

4. The method as in claim 1, wherein the unique object identifier is written as a unique 64-bit number.

5. The method as in claim 4, wherein the unique 64-bit number is divided into a multiple of a numerical number block, and wherein each of the multiple of a numerical number block represents a characteristic of the at least one characteristic.

6. A Radio Frequency Identification (RFID) comprising:

a unique object identfier having at least one characteristic encoded into the unique object identifier, wherein the at least one characteristic is selected

from the group consisting of: a model of the object, a year of production of the object, a physical characteristic of the object, a service provider for the object, and an object identifier.

7. A Radio Frequency Identification (RFID) card, for a given service provider, having stored thereon, computer-readable and computer-executable instructions which, when executed by a processor, cause said processor to perform steps comprising:

a) generating a unique object identifier based on at least one characteristic associated with the object;

b) updating a list of object identifiers, stored at a database for the given service provider, to prevent a conflict in the list of object identifiers;

c) writing the unique object identifier to the RFID tag, located on the object; and

d) registering the object in a central database, associated with the service provider, for tracking the object using the unique object identifier.

8. A system for tracking a Radio Frequency Identification (RFID) tag encoded for identifying an object, said system comprising:

an RFID card for generating a unique object identifier based on at least one characteristic associated with the object, for updating a list of object identifiers, stored at a database for the given service provider, to prevent a conflict in the list of object identifiers, and for writing the unique object identifier to the RFID tag, located on the object; and

a central database for registering the object associated with the service provider, and for tracking the object using the unique object identifier.

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